• **Remarks** begin on page 24 of this paper.

AMENDMENTS TO THE SPECIFICATION

Please replace Paragraph [0024] with the following paragraph rewritten in amendment format:

[0003] Present day brush commutated electric motors include an armature having a plurality of coils wound in slots formed in the lamination stack of the armature. With traditional motor designs, the lamination stack of the armature forms a plurality of circumferentially arranged slots extending between adjacent pairs of lamination posts. Typically, two coils per slot are used when winding the armature coils on the lamination stack. Among the two coils of the same slot, the one which commutates first is referred to as the first coil and the one which commutates second as the second coil. The second coil has inherently poorer magnetic commutation than the first coil because the second coil passes beyond the magnetic neutral zone within the stator before it finishes commutation. This is illustrated in simplified fashion in Figure 1, wherein the commutation zone of the first coil is designated by Z_1 and the ~~commutator~~ <u>commutation</u> zone of the second coil is designated by Z_2. A Rotor "R" is shown positioned at the mid-point of the first coil commutation zone. As a result, the second coil commutation can generate significant brush arcing, and becomes the dominant source of the total brush arcing of the motor. This can also cause electro-magnetic interference (EMI) to be generated which exceeds acceptable levels set by various government regulatory agencies. This brush arcing can also lead to accelerated brush wear.

[0020] Coil number 2 (25_2) also has a first subcoil portion 2A and a second subcoil 2B in series with one another. Subcoil portion 2A is wound in slots S_1 and S_6 with seventeen turns. Subcoil portion 2B is wound in series with portion 2A but around slots ~~5_2 and 5_7~~ S_5 and S_7 of the lamination stack 14, and with seven winding turns. The end of subcoil portion 2A is coupled to commutator segment 12_2 while the end of subcoil portion 2B is coupled to commutator segment 12_3. The first subcoil portion 2A of coil 25_2 overlaps the second subcoil portion 1B of coil 25_1.

[0023] The above-described pattern for coils 25_1 - 25_4 is repeated until all of the coils (in this example ~~12~~ 24 coils) are wound onto the lamination stack 14. Each of the ends of the coils 25_1 - $25_{\cancel{12}\ 24}$ are further secured to immediately adjacent pairs of commutator segments 12_1 - 12_{24}. For example, coil 25_5 has its ends secured to commutator segments 12_5 and 12_6, coil 25_6 to segments 12_6 and 12_7, and so forth.

[0024] The above-described winding pattern significantly improves the commutation performance of all of the second coil portions of the coils 25. Splitting each coil 25 into first and second subcoil portions allows each first subcoil portion to shift its magnetic axis away (i.e., laterally), from the position it would have otherwise had in a traditional two-coil-per-slot approach. This is illustrated in Figure 5. All of the first subcoil portions shift their magnetic axes forward to produce a first coil commutation zone, as indicated by ~~line~~ region 30, and all of the second subcoil portions shift their magnetic axes backward to produce a second coil commutation zone, as indicated by ~~line~~ region 32, in reference to the armature's 10 rotational direction. Both of these commutation zones are now in a ~~magnetic neutral zone between field coils 34~~ common, overlapping angular region with respect to the field coils 34, as shown in Figure 5. Further, it can be seen by

examining Figures 4 and 5, that these commutation zones are also in a common angular position with respect to the commutator bars to which the coils are connected. With a turns ratio between the two subcoils of about 3:1, this winding pattern smoothes out the magnetic "unevenness" between adjacent coils, which is a drawback with traditional two-coil-per-slot winding patterns. This, in connection with the shifting of the resultant magnetic axes of each coil, serves to significantly improve the commutation efficiency of the motor and to reduce the overall brush arcing.